

REMARKS

At the time the Office Action issued, claims 1 – 20 were pending. In the Office Action mailed June 28, the Examiner rejected claims 1-20 under 35 USC § 103 as obvious in view of the combination of US 4823892 to Fuller in view of US 3269470 to Kelly.

Claim Objections

Claim 1 has been amended to correct the informality identified by the Examiner.

Claim rejections under 35 USC § 103

In support of the rejection of the claims, the Examiner asserts that Fuller discloses a rotary bit meeting the limitations of claim 1, except that the bit is not also a percussion bit. The Examiner then cites Kelly for teachings of a rotary-percussion drill bit. The Examiner asserts that Kelly teaches a bit "with drag-type cutters similar to that of Fuller" and states that "it would have been obvious. . . to substitute one method (i.e. rotary-percussive drilling) for the other (rotary drilling)" to achieve a predictable result.

First, Applicant respectfully submits that the Examiner's conclusory logic regarding obviousness falls short. It is not sufficient to merely state that two concepts could be combined and then to summarily state that the result would have been predictable. Since each reference teaches a drill bit, it may be "predictable" true that "drilling in a formation" would be the result of drilling with a bit that embodied the combined teachings of Kelly and Fuller, but that is not the correct level of analysis. The correct criteria for success are whether there would be bit-ballling, whether the cutters would cut efficiently, and whether commodity shear cutters would be required (See, the present specification and discussion of objectives). With these questions in mind, Applicant respectfully submits that the results of the presently claimed invention are not predictable. Even a brief review of the drill bit art reveals that there are myriad problems that hinder successful bit operation.

Next, Applicant submits again, that the operations of rotary and percussion drill bit are very different. It is this difference that causes the two types of bit to have different designs. The difference is so substantial than the question of whether a

person working on one type of bit would think to consider using features from the other type of bit is not meaningful; rather, a person working in the drill bit art would know that merely adding percussion impact to a rotary bit—or adding shear cutters to a rotary-percussion bit—would not necessarily have any expectation of success.

Still further, Applicant points out that the trailing cutter elements of Fuller, namely abrasion elements 16, 27, are not axial cutters as recited in the present claims. Fuller teaches that his abrasion elements 16, 27 are preferably made of a superhard material (see col. 4, lines 24-32). It is well known in the art of cutter elements that hardness and toughness are inversely related.¹ Thus, one of ordinary skill in the art would know that the abrasive elements of Fuller would be unsuitable for impact duty, and would know that the application of percussive impacts to the abrasive elements of the Fuller bit would likely result in shattering those elements.

Finally, in order to further emphasize these distinctions, Applicant has amended independent claims 1, 13 and 14 to require that the axial cutters are also impact cutters. Applicant respectfully submits that this distinguishes the claims from the teachings of the references.

Reconsideration of the rejection of claims 1, 13, and 14 and the claims that depend from them is therefore respectfully requested.

Claim 5

Claim 5 has been amended to require that axial cutters be arranged such that the penetration depth of the shear cutters is less than that of the axial cutters. This is directly contrary to the teachings of Fuller, which suggests that the abrasive cutters extend a shorter distance from the bit body than the shear cutters. Therefore, Applicant respectfully submits that claim 5 is allowable.

¹ See, for example, US Patent 6241036, which includes the following discussion of cutter properties: "Conventional impregnated segments typically carry the super-abrasive particles in a continuous phase of a hard material, such as tungsten carbide, a tungsten alloy, a metal carbide, a refractory metal alloy, a ceramic, copper, a copper-based alloy, nickel, a nickel-based alloy, cobalt, a cobalt-based alloy, iron, an iron-based alloy, silver, or a silver-based alloy. Such materials are, however, typically relatively brittle and may fracture when subjected to the stresses of drilling. Accordingly, when subjected to the high stresses of drilling, and particularly impact stresses, the continuous phase of such impregnated segments may break, resulting in the premature failure thereof and potentially the premature failure of the bit upon which such segments are carried." (emphasis added).

Concluding remarks

Attorney believes that each grounds for objection and rejection has been addressed. Attorney respectfully submits that the claims are in a state ready for allowance, and as such prompt issuance of a Notice of Allowance is respectfully requested.

In the event the Examiner has any questions or issues regarding the present application, the Examiner is invited to telephone the undersigned prior to the issuance of any written action.

Respectfully submitted,
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